

## **From Cognitive to Critical Musicology: Shifting Notions of the Structure of the Musical Mind**

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In memory of Th. W. Adorno

### Abstract

An outline of the notion of Critical Musicology as grounded in dialectical thinking and the cognitive-developmental sciences. Notions of cognitive musicology are detailed from an epistemological point of view in the sense both of Adorno's and my own writing. After recalling the cognitive revolution of the 1970s and 1980s and the impact of artificial intelligence thinking on musicology, I briefly outline the main tenets of cognitive musicology and extend its research program into dialectical thinking in music. In addition to establishing a link between dialectical and developmental thinking in cognitive musicology, I outline the epistemological foundations of **Critical Musicology** including some pedagogical ramifications.

Key words: cognitive musicology, critical musicology, developmental science, dialectical thinking.

### Historical introduction

Critical musicology in the sense here intended has a complex intellectual history (1955- present) which is best understood by beginning with the Frankfurt School, especially Adorno's musicological work. In the late phase of his adult development and thinking, my teacher Adorno established a new type of musicology that was "critical" in the sense that it discovered traces of societal transformation in the very core of notated music compositions and performances of classical and "new" music that, as a composer, he was deeply knowledgeable about. Immediately after his untimely death in 1969, I began to establish the foundations of *cognitive musicology* (Laske, 1972), a discipline whose foundations can be found in the computer sciences, especially generative grammar and information processing psychology (Chomsky, 1965; Simon, 1973). These foundations are laid out in a large number of – today often inaccessible -- publications between 1970 and 1993, initially summarized in my book on "Music, Memory, and Thought" (1976; Schuler, 1995; Tabor, 1999).

In harmony with Adorno's focus on compositional thinking, cognitive musicology as I have designed and practiced it is grounded in the theory of knowledge (epistemology). I focused this discipline on the composer's cognitive process – especially in electronic music. The question that arose for me in the 1970s was: "what is the structure of the musical mind?" This question conveys the structuralist approach I followed based on early tenets of computer science [co-created by H. A. Simon, M. Minsky, A. Newell, and J. McCarthy in 1956] and generative grammar. I attempted to answer this question based on Chomsky's work regarding generative grammar (Chomsky, 1965) and slightly later on the new knowledge flowing from the young discipline of computer science, especially information-processing psychology (H. A. Simon, 1973).

It speaks to the caliber of Chomsky's research that he initiated a debate with J. Piaget about the underlying structure of thought and language (Inhelder, 1978). What initially pitted Chomsky against Piaget (1975) looks quite different from our present knowledge of adult cognitive development (Basseches, 1984; Laske, 2009). The major difference between Chomsky and Piaget is found in the fact that what for Piaget is an outcome of a gradual process of construction

throughout childhood and adolescence is for Chomsky an innate capability of synthesizing increasingly complex levels of human cognition. Chomsky and Piaget's debate was advanced another notch by the Kohlberg School (1960 f.) whose members – among them my teachers R. Kegan and M. Basseches – showed that human development is life-long and that the development of adults is qualitatively different from that of children and adolescents, a fact referred to by the notion of *adult development* (Kegan, 1982; Basseches, 1984).

All of these intellectual streams from the 1970s onward have a bearing on what today we might want to consider Critical Musicology. Now that Adorno's work has become available in English, it is, I think, time to bring together the two strands of the new musicology, namely the critical and the cognitive strands. In my own work, the cognitive strand has undergone a further transformation beyond Piaget which I will briefly outline below. This transformation has to do with the notion ultimately deriving from Piaget's studies in child development, that human cognition is a *constructive-developmental* process whose phases can be outlined by way of qualitative research, using semi-structured interview-based assessment methods (Laske, 2006, 2009).

In what follows, I will link the tri-partition of cognitive musicology into *competence, performance, and task environment* studies, inspired by computer music technology and introduced in my Utrecht Writings (Schuler, 2004), to the foundations of post-Adorno dialectical thinking as outlined by M. Basseches (1984), R. Bhaskar (1993) and myself (2009). I will further link cognitive musicology activities to the use of *dialectical thought forms* that can be taught as a basis of, and tool set for, practicing critical musicology.

#### A short review of cognitive musicology

Computer music composition technology in the 1960s and 1970s – when I studied it – offered to composers and music theorists the challenge to rethink not only their tool set but also the process by which music is made, and even the categories in terms of which “music” had so far been thought about in musicology. This holds true for both score synthesis (the computation of score parameters) and sound synthesis (the computation of acoustic material to be machine-read according to score parameters). Rather than becoming a critic of conventional, historically oriented musicology – a thankless task given the dominance of that kind of musicology -- I decided to bypass it entirely and put in place a cognitive framework for studying music based on Chomsky's and Simon's writings (Tabor, 1999; Schuler, 2004). This entailed asking myself as a philosophy-trained composer what were the dimensions of real-time compositional work using hardware and software -- and thus of musical competence -- that I could conceptualize such that a new kind of musical research based on real time observation and data collection would become possible. I called these dimensions *syntax, semantics, and sonology* (Laske, 1972; 1975).

Together with an electronic music composer and student of mine at the Instituut voor sonologie, Utrecht, Barry Truax, I put in place the software system OBSERVER (1972-75). Observer was based on the PDP-10 and permitted letting children use electronic sound – thus bypassing notation – in elementary composition tasks in which the melodic, rhythmic, and harmonic structure of the sound stream could be modified based on listening. The computer kept a “protocol” inspired by H.A. Simon's protocol analysis procedure (1973) by which Simon “observed” chess players at work for the purpose of building computer programs that could win a game of chess against a human player. The purpose of Observer was not to produce computer music, but rather to generate new insights into the development, in children, of compositional thinking in the sense explored by Piaget regarding logical thinking (Laske, 1979).

In analyzing Observer protocols – which later, at Carnegie-Mellon, I attempted to use as a basis of simulating the children’s work on a computer (1975-77) – it became clear that the categories of traditional musicology would have to give way to three different dimensions of the musical mind which, following Chomsky, I called:

- Competence [syntax, semantics, and sonology]
- Performance [real-time use of competence in social environments; musical “speaking”]
- Task environment [comprising the technology and historical conditions influencing the composer’s work].

Having sorted out Chomsky’s and Simon’s contributions, respectively, to cognitive musicology, I began to see these dimensions as forming the logical structure of a generative grammar for music (Schuler, 1995; 2004). *Competence* was conceived as the intrinsic *living* musical knowledge of the composer and performer. *Performance* was conceptualized as the use of competence in real time along information processing psychology lines. Performance could potentially be split up between the knowledge of the living composer and the software s(he) had selected to use for a particular composition which contained automated knowledge (Laske, 1990). The notion was that work with sounds in real time could be observed by a computer that would keep a protocol of actions on musical material taken, which then could be analyzed for understanding the process of music creation more deeply. *Task environment*, finally, comprised the entirety of compositional tools – whether notation, software, or hardware – that the composer’s mind intimately had to connect with in order to bring a work to fruition. This might include designing one’s own task environment (as far as one was conscious of it), by selecting specific computer programs, either for *score synthesis* or *sound synthesis*, or both.

From this tripartite concept of the compositional process derived an equally partitioned notion of new music research – first called “psychomusicology” and then “cognitive musicology” – that was meant to account for the structure of the musical mind observed in real time work, whether regarding composition, performance, analysis, theory of music, or musicology (Laske, 1984). From this concept also sprang the notion (Laske, 2004) that there is no other history of music than the contemporary musical performance practice by which historical musics are actually “remembered” *here and now*. These thoughts were summarized by me as follows (Schuler, 2004 [from the German]):

My Utrecht Writings are an attempt to create, in bypassing conventional music theory and musicology, a cognitive theory of music that employs ways of thinking fostered by the computer in order to open a window into future musics. The author argues that a theory of music has to understand not musical results but rather the mental processes that lead to such results. It is thus not compositions, but their relationship to the musical processes they are created by that are in focus in the new musicology. As a result, this discipline needs to become a cognitive discipline focused on the goal to understand processes of musical thinking, with a precision now possible on account of computer software.

This notion of cognitive musicology naturally led to what in the 1980s began to be called “music and artificial intelligence” (Balaban et al., 1992). While this discipline quite successfully undertook to shed light on musical performance and the task environment (of both composition and analysis), it failed to answer the – rather presupposed – question of what was to be considered *musical competence*. Although Lehrdahl and Jackendoff attempted to answer this question for the special case of tonal music (1996; Laske, 1992), a theory of musical competence in a more general sense of the term never came to fruition. In my view, this is due to failing to understand the developmental underpinnings of adult mental processes employed in music making. In

addition, bringing competence, performance, and task environment together requires dialectical thinking, and such thinking was not available to music researchers outside of the Frankfurt School

### Two dimensions of adult development

The discussion between Piaget and Chomsky in 1975 rendered two opposing views of linguistic, and by extension, musical competence. What one saw as a life-long process of internal cognitive construction, the other saw as “innate.” From a dialectical-thinking point of view, this separation between innateness and construction is an artifact of human *understanding* in contrast to dialectical *reason* (Bhaskar, 1993; Laske, 2009). Understanding is rooted in formal logic and consequently unable to fathom that historical processes are inseparable from innate capabilities and that both need to be linked using *dialectical thought forms* (Adorno, 1999; Laske, 2009). While this seems straightforward enough once one grasps what dialectical thought forms are and how to apprehend them, the cognitive sciences that investigate adult development -- above all “developmental psychology” -- have (in my mind) put further obstacles in our way of seeing clearly what is the nature of musical competence.

The main obstacle to making cognitive musicology plainly “critical” in the precise scientific sense is the present cleavage between what I critically refer to as *social-emotional* in contrast to *cognitive* development (Laske, 2006, 2009). The lack of distinction between these two best researched strands of adult development dates from Loevinger’s (1976) and Kegan’s work (1982) that is based on a very narrow concept of cognition excluding dialectical thinking in the sense of Adorno (1999), Basseches (1984), and Bhaskar (1993). Put differently, the obstacle is due to not acknowledging cognitive development as a line of adult development that is independent of, although complementary to, social-emotional development. Briefly, both of these types of adult development regard subject-object relationships. The difference between these two lines is that between asking two fundamentally different but at the same time inseparable questions:

1. Social-emotional question: what should I do and for whom [what is my social object]?
2. Cognitive question: what can I do and what are my options? [what is my epistemological object]?

As a practitioner of developmental psychology, I speak of social-emotional *meaning making*, on one hand, and cognitive *sense making*, on the other (Laske, 2009). Since these two dimensions are separate and inseparable at the same time, their intertwinement is truly dialectical. It can be elucidated further for the case of musical creation and listening.

### Making sense versus making meaning in music

It is evident from self observation that musical listening as well as composition and performance call upon all human capabilities, and that these capabilities are *emotional* as well as *cognitive* in the sense of “thinking”. Due to the fact that the legacy of the Frankfurt School, especially Adorno’s work, has so far not been integrated into developmental studies, there is presently a paucity of practice of dialectical thinking both in the social sciences and in and arts education. This is indirectly supported by the fascination the glittering contents of the Frankfurt School evoke, which makes it easy to bypass the question of what precisely is the *structure* of the School’s thinking.

I have attempted to remedy this situation in my recent book entitled *Measuring Hidden Dimensions of Human Systems*, by including a Manual of Dialectical Thought Forms. The book shows that in contrast to social-emotional development cognitive development does not occur in “stages” but rather in “phases”, and that these phases – first outlined by Basseches (1984) and further clarified by Bhaskar (1993) – have to do with the gradual refinement of formal logical thinking (researched by Piaget) in the direction of using *dialectical thought forms*. I have also

shown that the present phase of an individual's dialectical thinking, in and outside of music, can be empirically assessed by semi-structured interview.

Western – in contrast to Asian (Nisbett, 2005) -- dialecticism originates in works of the late Plato and Hegel's work, although elements of it can be found in Aristotle and Kant as well (Bhaskar, 1993). It is a way of thinking in which the linguistic relationship between subject and predicate is not one of description of static objects having attributes ("the rose is red"). Rather, the subject "rose" – to employ this example – is considered as something that has to be *discovered* through further conceptual elaboration and argumentation (dialectical comments) transcending the simple assignment of an attribute or set of attributes. The question we are left with after reading dialectical thinkers such as Hegel, Adorno, and others is, of course: "how does dialectical thinking develop?" and "how can it be taught?" Answering the first question lays the foundation for answering the second.

The first question was first taken up in the 1980s by a member of the Kohlberg School at Harvard, my teacher M. Basseches who, in Adult development and dialectical thinking (1984) showed that the development of dialectical thinking can be empirically investigated by semi-structured interview. The interview probes the present capability of an adult to use a finite set of dialectical thought forms in reflecting upon a particular task and task environment. As I have shown in my teaching at the Interdevelopmental Institute since 2000 ([www.interdevelopmentals.org](http://www.interdevelopmentals.org)), the use of dialectical thought forms can be taught to anybody who is at the required epistemic position of seeing the world – including esthetic artifacts -- as being in unceasing transformation, composed of a multitude of layers, and defined by intrinsic and constitutive relationships.

When the notion of dialectical thinking as a result of adult development, and pragmatically as a *discovery procedure* (rather than only a mode of argumentation or rhetoric) is adopted, a notion of human cognition, including musical thinking, emerges that is quite different from the formal-logical procedure of fixating attention on objects having attributes. The latter notion is provably insufficient for mentally conceiving of what we call "music" which, like the real world, is in unceasing motion, always pointing to a broader past and future context, and filled to the brim with relationships between its parameters and elements. With a view to musical artifacts and/or their performances, the challenge, first formulated and answered by Adorno, is to "discover," through forming constellations of dialectical concepts, what is the structure and esthetic form of a work, by taking into account the historical task environment in which the work has been created.

For example, in his study of Wagner's work, Adorno deals with both the socially mediated emotional meaning making of Wagner the person and the ideal-typical structure of his thinking as a man of his time. Adorno trusts that in bringing to bear his own compositional and performance knowledge of Wagner's work and insight on the historical task environment in which Wagner created his compositions, he can "discover" fresh implications of "how Wagner, the composer, actually thought." Adorno would have dismissed attempts on the side of developmental psychology to understand Wagner's creativity as based on the reduction of a complex historical task environment to a single ephemeral individual – thus as a detotalization of this individual's mind. He would, rather, have insisted that this individual represents a micro-cosmos that no other than a dialectical analysis of the structure of his notated and sounding work could successfully reconstruct, even disregarding his personal life. Unable to say anything about the use of Wagner's competence in real time (performance) – Wagner being dead -- he focused on what he inferred was Wagner's musical competence and task environment. In this way, he adhered to "conventional" musicology procedures, but with an important twist since he was superbly capable of linking elements of competence and task environment by using dialectical thought forms.

### Consequences for Critical Musicology

In light of the fact that empirical research in dialectical thinking in music can only be carried out by engaging *living* composers, performers, critics, and teachers, Adorno's example of studying a *dead* composer based on the notation and performance of his works represents a standing invitation to a critical musicology that has learned the lessons of cognitive science, especially cognitive-developmental research. In accepting this intriguing invitation, the pedagogical question that arises is simply: "how can we teach dialectical thinking (beyond reading and regurgitating Adorno's work), to keep Adorno's thinking alive?" In fact, in my experience as a participant of Adorno's *Hauptseminar* from 1958 to 1966, this question was at the core of all of his teaching.

Clearly, to think about music in the way Adorno was able to do is an adult-developmental, not just a cognitive, achievement. As Adorno's writings show it requires a level of both social-emotional and cognitive adult-development that is not reachable for everyone. To understand a composer's work at the level of Adorno's thinking would presuppose being able to answer four main questions:

- What is the composer's level of social-emotional development, i.e., how does s(he) as a person relate to others and society at large in terms of stages of adult development (or meaning making)?
- What is the composer's level of cognitive development, i.e., how far does s(he) transcend formal-logical thinking into dialectical thinking, and how does s(he) transfer his thinking-in-language to the structure of a notated or electronic work (sense making)?
- What in the structure of notated work performed in real time elicits in us as listeners a comprehension of our adult existence and the social world we live in that transcends formal logical thinking (i.e., understanding in contrast to reason)?
- In what way does a musical work lead us to transcend our notion of ourselves and our society as we psychologically experience it?

I would venture the hypothesis that answering these questions in itself requires exercising dialectical thinking, and that this kind of thinking can be taught to students of music and musicology today. Both as a composer and musicologist who has observed and "protocolled" himself and interviewed others at work in music I would say that awareness of an individual's musical thinking, when probed by semi-structured social-emotional and cognitive interview, goes a long way toward understanding the structure of the works the individual is able to learn, compose and/or apperceive.

I immediately hear the objection, of course, that thinking in language is incommensurable with thinking in music. This is certainly true. But from my compositional experience I would postulate that there is a *discernable and explicable connection* between a composer's thinking in language and music. This connection can, I believe, be gauged in terms of dialectical thought forms as I have shown in my recent book on dialectical thinking (Laske, 2009). I would suggest, therefore, that we study the *history of music* through real-time and recorded performances of historical artifacts as well as contemporary music creations through recordings, sonographs, program notes and other musical texts, as well as developmental interviews of their learners and creators.

### Conclusion

As a prolegomena to critical musicology studies I would thus recommend introducing a suitable cognitive science curriculum structured so as to enhance dialectical thinking. Based on my own musical research, on one hand, and my research in dialectical thinking, on the other, designing and experimenting with such a curriculum is an exciting task. All that is needed is focusing

attention on mental processes in music, rather than only the artifacts such processes yield, as I first proposed in my *Utrecht Writings* of the early seventies (Schuler, 2004). Once we are so engaged, it will become possible to take up the question of “what is musical competence?” and to link answers to this adult-developmental question to our knowledge of musical performance (in the sense of Chomsky) and of musical task environments (in the sense of Adorno).

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